

**HITACHI**  
Inspire the Next

# NEXTA<sup>®</sup> DMA

VISIBLY BETTER



THERMAL ANALYSIS



# As a reliable instrument for product engineers in applied research and materials development, Hitachi's DMA analyzers offer precise and dependable measurements of mechanical properties for both simple and complex materials.

The Dynamic Mechanical Analysis (DMA) technique enhances sensitivity in measuring glass transition and material stiffness while also assessing the impact of frequency on mechanical characteristics.

## See more, measure more and save valuable time with the DMA200.

Meet the DMA200, featuring an extended 20N force range. Engineered to characterize materials demanding significant force for deformation, it sets a consistent standard of precision and reliability – whether addressing carbon fiber composites or intricate samples.

Integrated within the analyzer is our powerful Real View® high-resolution camera. This Hitachi technology enriches sample observation across varying temperatures, capturing real-time images directly tied to the DMA signal.

The DMA200, with its patented Fourier transform operation, offers world-class sensitivity and unmatched force resolution for measuring the smallest transitions. It accommodates a wide modulus range and includes functions like synthetic oscillation and Lissajous monitoring for catching rapid modulus changes and ensuring data reliability.

## Comprehensive materials characterization made easy.

### Extended 20N Force Range

Utilize the extended range to characterize materials demanding substantial deformation force, particularly beneficial for applications involving carbon fiber composites and intricate samples.

### Ultra-high Sensitivity

A wide applied force range with 5E-6N resolution and very low levels of noise in the output signal makes the DMA200 sensitive enough to detect and resolve the smallest transitions.

### Cutting-edge Real View® Technology

Real View® provides high-res, real-time DMA signal images across a range of temperatures. It includes color analysis and result videos, aiding property change identification, especially in failure analysis, particle examination and result investigation.

### Results You Can Trust

Confidently verify data point reliability during or after analysis using the Lissajous monitor function, ensuring dependable results.

### Low-cost Operation

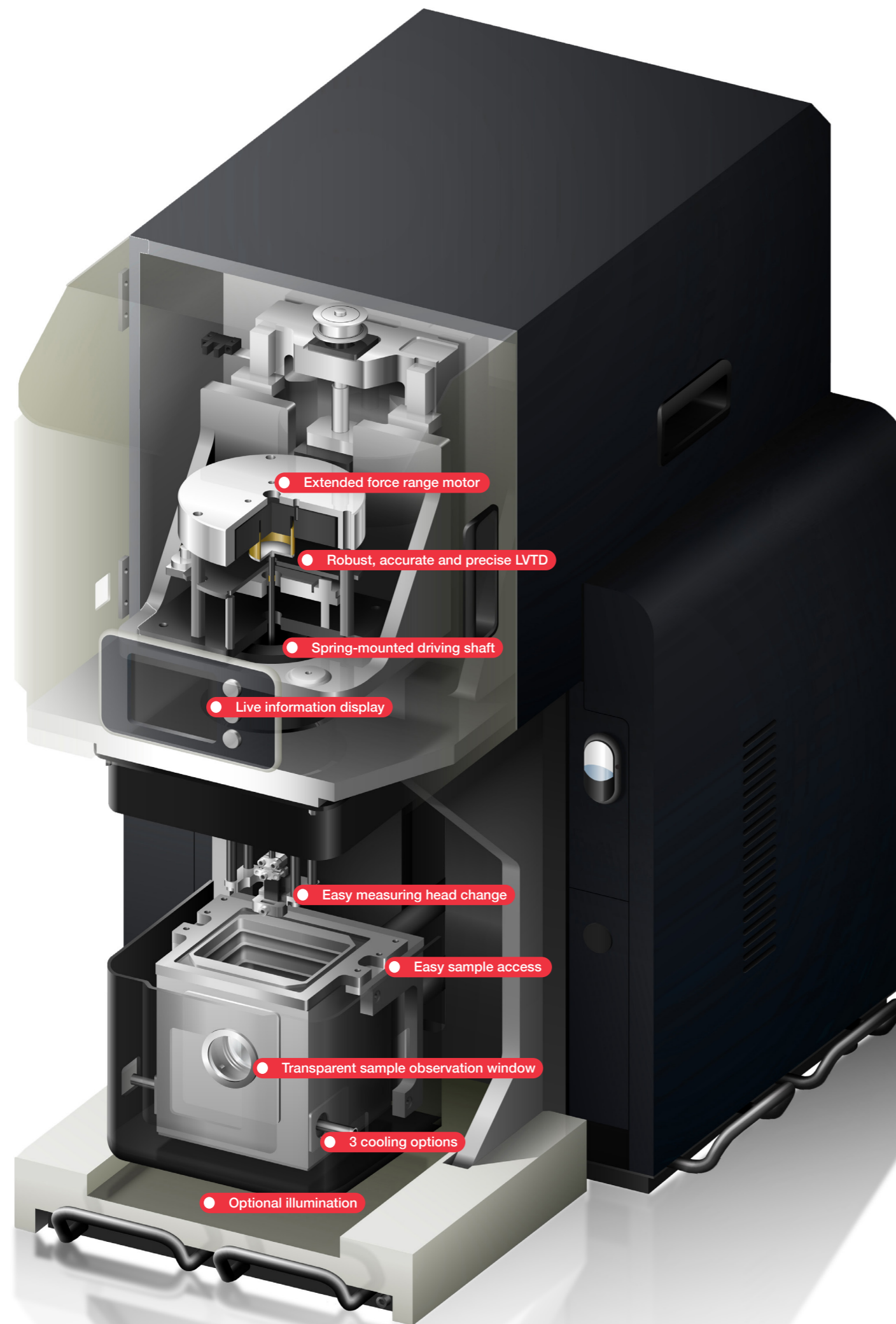
Choose from air, liquid nitrogen, and electrical gas cooling options. Electrical gas cooling requires only power, eliminating the need for external resources like liquid nitrogen. When the use of liquid nitrogen is necessary, the platform reduces consumption by up to 30%, optimizing costs and running time.

### Comprehensive Mechanical Analysis

The Real View® system, diverse probes, rapid modulus change detection and advanced analysis offer valuable insights for research. Software options, including master curve (TTS) and activation energy calculations, ensure adaptability across a wide range of applications.

### Easy To Use

'Guidance Mode,' tailored for non-experts, offers intuitive step-by-step measurement and analysis instructions. Incorporated as standard, a versatile measuring head range, and optional, user-friendly lighting enhances convenience.

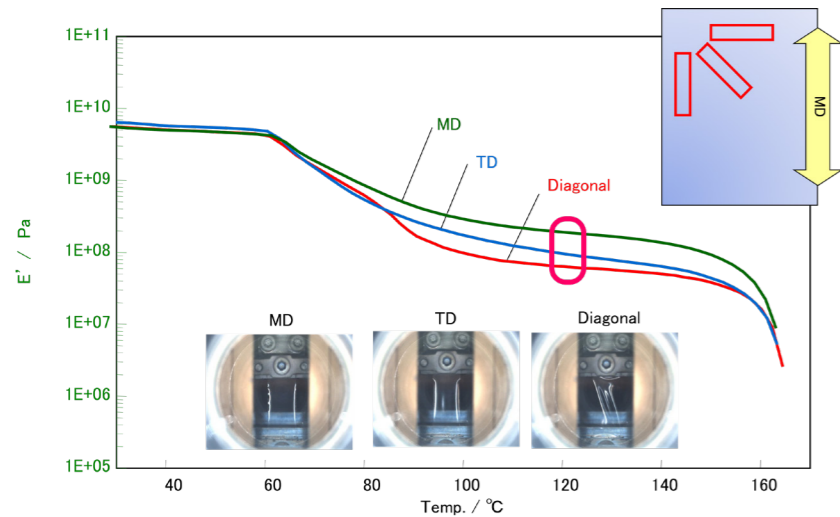


## DMA200 technical specifications

Deformation mode options	Tension, single/dual cantilever, 3-point bending, shear, film-shear, compression		
Maximum force	20N		
Modulus range	10 <sup>3</sup> to 10 <sup>13.5</sup> Pa		
Measurement mode	Dynamic measurements: sinusoidal wave / synthesis wave oscillation modules Static measurements: program stress control / program strain control		
Frequency	Sinusoidal wave oscillation: 0.01 to 200Hz, max 20 frequencies Synthesis wave oscillation : 5 frequencies		
Temperature range	Liquid nitrogen cooling -150°C to 600°C	Electric gas cooling -100°C to 600°C	Air cooling RT to 600°C
Sample observation	Real View® ready		
Driving shaft	Spring mounted		
Sensor	Robust, precise and accurate LVDT		
Dimensions	420 (W), x 630 (D) x 725 (H) mm		



# DMA Real View® for Visibly Better Analysis



**Redefine the way you conduct analyses with our advanced technology, enabling precision and real-time observation like never before.**

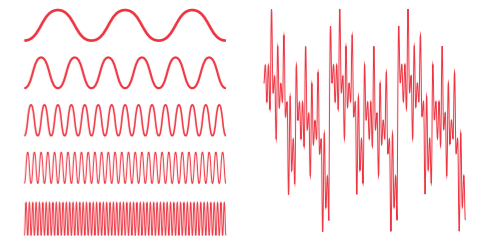
Real View® provides real-time visual insight into the behavior of your sample during analysis and after. This comprehensive view prevents misinterpretation, offering a clear understanding of the sample's progress and enhancing the accuracy of results.

If a sample is not mounted properly, it might give unexpected results which could be difficult to understand. In this example, Real View® allows us to see that the sample was mounted diagonally to its anisotropy, resulting in a two-step glass transition on the storage modulus. Similarly, an  $E'$  increase before the

glass transition point typically signifies a thermal phenomenon, such as crystallization. However, the same result can occur if the sample is not clamped properly in the fixing. Viewing the sample during this process makes it clear. With Real View®, you can monitor your sample in real-time. The visual data is captioned, allowing you to replay the video post-event. The software correlates the visuals with the output trace points. Real View® also enables the observation and measurement of color changes in temperature-affected samples.

## Synthetic Oscillation: catch fast modulus changes.

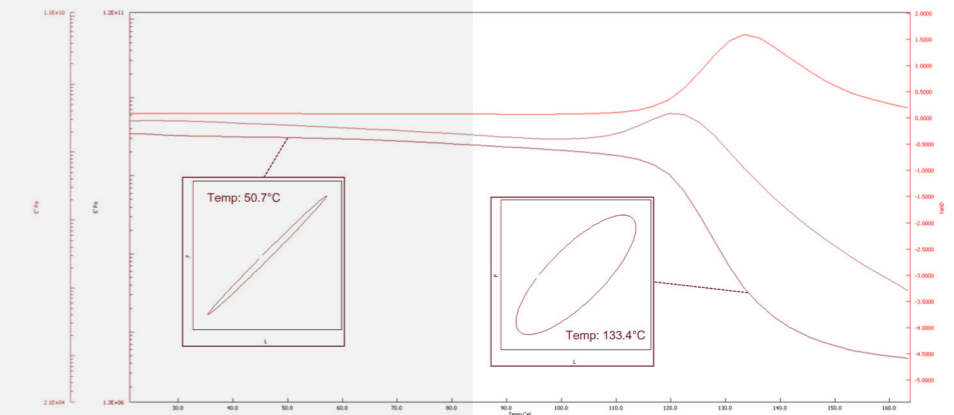
As well as being highly technical, DMA measurements can take a long time when compared with other thermal analysis techniques. To help accelerate material characterization, the NEXTA TA software can create synthetic oscillations comprised of up to five different frequencies at the same time. This is especially useful for very fast modulus changes, where the change can be easy to miss using standard sinusoidal oscillations of a single frequency.



Five different sinusoidal waves  
Synthesised wave

## Lissajous Monitor: confidence in your data.

The Lissajous monitor function gives a simple way of checking the reliability of each data point. You can do this in real time during a measurement, or you can go back and check each point after the analysis is complete. This function gives you the relationship between stress and strain of the sample. You are looking for an even, regular shape in the Lissajous output graph (see diagram for example of a 'good' shape); if you get odd bumps in the shape, then the results need investigating further as you may have an issue with the sample setup in the fixture.



## Powerful technology made easy to use with NEXTA TA software.

DMA is one of the most technical thermal analysis techniques for material characterization, often needing expert operators to set up the analysis and start the measurement.

The NEXTA TA software simplifies DMA sample setup and analysis through 'Guidance Mode.' This mode provides step-by-step assistance for analysis setup, covering analysis method details, sample information input, analysis execution and result extraction. This feature makes the DMA200 suitable for teaching labs and non-specialist staff-conducted analyses.

Transitioning between modes is simple: switch from 'Guidance Mode' to 'Simple Mode' for experienced analysts, displaying essential features, and then to standard mode for advanced users with full parameter access.

The NEXTA TA software also offers offline data analysis, enabling analysts to work with results remotely without requiring additional licenses.



# Analysis Empowered by Wide Force Range



Advanced magnetic circuitry and high-frequency, high-resolution LVDT technology allow for precise force measurement across a wide range, accommodating both low and high forces.

With a wide force range of up to 20N, the instrument empowers the analysis of stiffer materials. It simplifies sample preparation, reduces the impact of sample size, and guarantees excellent performance for both soft and stiff samples. Moreover, embracing a wide range of sample stiffness maximizes flexibility, enhances load control precision, and minimizes noise levels, ensuring consistently reliable and stable outcomes.

## Extended 20N Force Range.

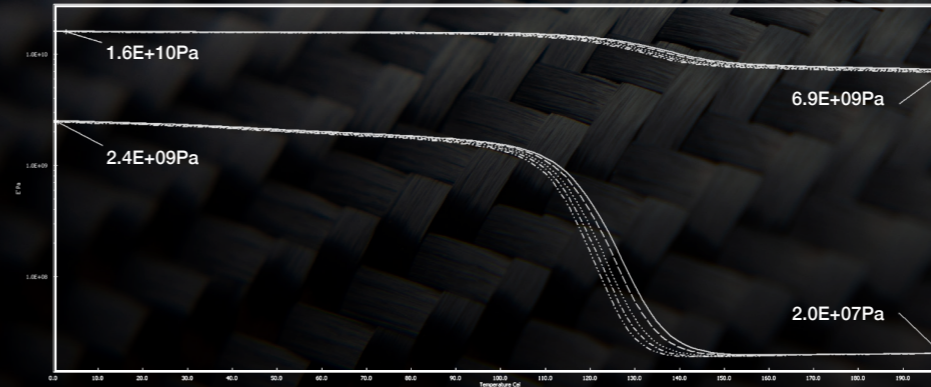
Utilize the extended range to characterize materials demanding substantial deformation force, particularly beneficial for applications involving carbon fiber composites and intricate samples.

## Ultra-high Sensitivity.

A wide applied force range with 5E-6N resolution and very low levels of noise in the output signal makes the DMA200 sensitive enough to detect and resolve the smallest transitions.

# High Force

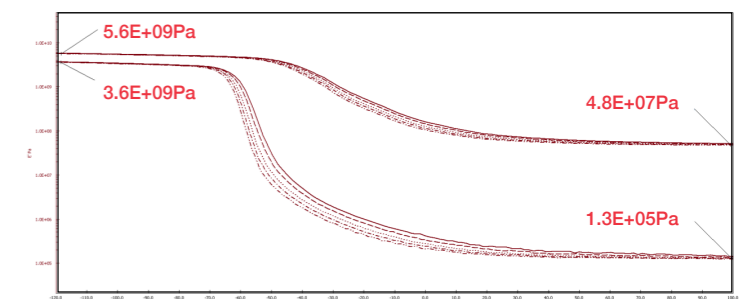
Glass fiber-reinforced epoxy resins, employed as printed circuit boards, underwent tension measurements. In contrast to pure epoxy resin, these resins exhibited an exceptionally high modulus of elasticity. While conventional machines demand narrower widths for high-modulus samples, DMA200's 20N load output allows for the measurement of samples with cross-sectional areas twice as large.



Graph presenting high elastic modulus

# Low Force

A comparison was made between the modulus of elasticity of urethane rubber, utilized for rubber packing, and urethane-based gels used as seismic gels. The seismic gel demonstrates a remarkably low elastic modulus above room temperature, contributing to reduced noise levels and enhanced stability, particularly above room temperature.



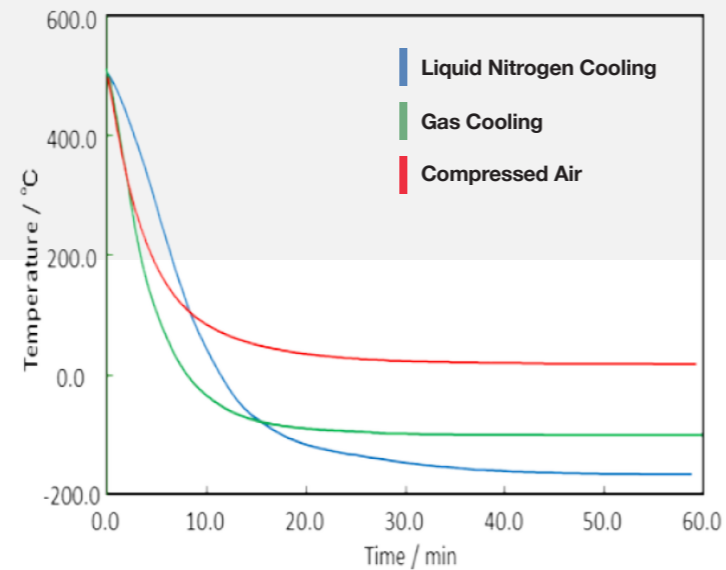
Graph presenting low elastic modulus



# Experience the Streamlined DMA200

## DMA200 cooling options

Name	Temperature Range
Liquid nitrogen cooling (LN2)	-150°C to 600°C
Compressed air	RT to 600°C
Electrical gas cooling	-100°C to 600°C



## Cooling choices for enhanced efficiency.

The DMA200 provides three cooling options: by air, liquid nitrogen and electrical.

### Electrical gas cooling

With a -100°C to 600°C measurement heating and cooling range, electrical gas cooling sets itself apart through its simplicity, relying solely on power and eliminating the need for external resources like liquid nitrogen. This streamlined cooling approach enhances the user-friendliness of the DMA200, ensuring efficient materials analysis.

### Compressed air

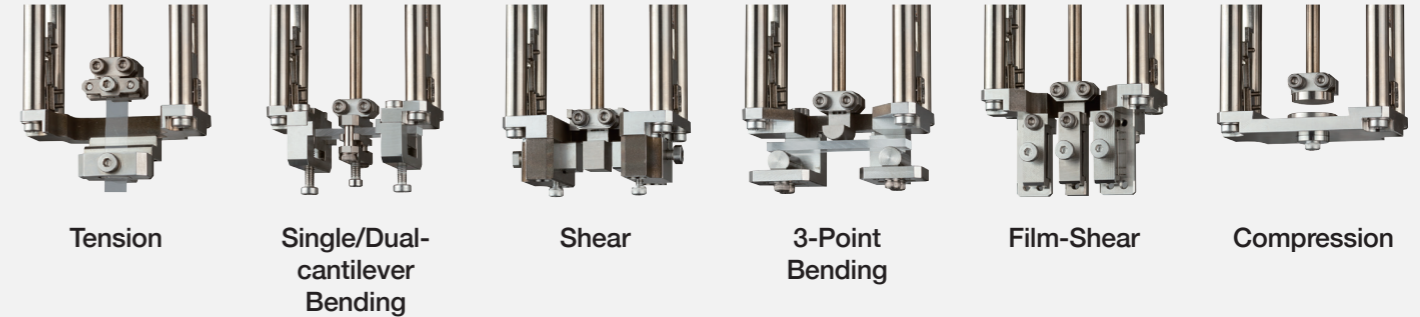
Air presents a cost-effective alternative for operators seeking to measure samples from room temperature up to 600°C. Utilizing compressed air, you can efficiently return your sample to room temperature after measurements, resulting in valuable time and cost savings.

### Liquid nitrogen

The liquid nitrogen dewar cooling platform's efficient design reduces consumption by up to 30%, optimizing operating costs and running time. With efficient liquid nitrogen control cooling, you can conduct up to 11 cycles (-125°C to 25°C) using a 30L Dewar.

## Versatile measuring head range and simplified sample changes

Experience the convenience of a versatile range of measuring heads and easy sample interchangeability, alongside the newly incorporated lighting system that simplifies changing both measuring heads and samples throughout your analysis.



## Deformation mode options

The DMA200 is delivered with the tension (1 or 2 point fixture) or bending measurement probe as standard. However, you can choose from a range of probes to suit the deformation mode you need. All measurement probes are made to be easily exchangeable and easy to mount samples.

## Optimize Workflow: Optional data input and output support.

Improve operational workflow efficiency and data reliability with the NEXTA optional software package.

### Improved reliability in quality control

Prevent human errors by automating data entry like measurement conditions.

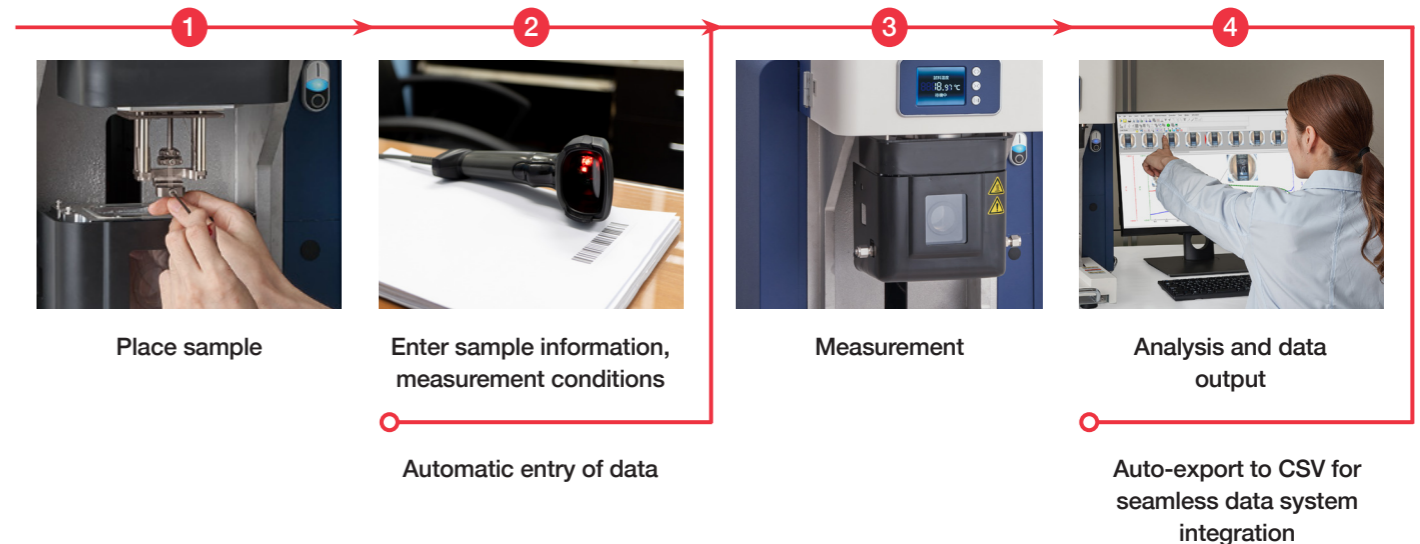
### Automate Workflow

Automatic entry of measurement conditions input through barcode scanning, minimizing human error.

### Efficient Data Input

Utilize the Mass Upload Template to register up to 5,000 identification codes, samples and conditions via CSV import in the NEXTA software. This feature also allows exporting analysis results with test items, lot numbers and serial numbers in CSV, Excel and text, enhancing internal management and quality control reliability.

## Automate entry of measurement conditions & data output.



# Understand how your materials perform with Hitachi thermal analyzers.

Seeing is believing. Our analyzers give you uncompromised quality control and enable you to reach the next level in research and development.

Seeing is believing with Real View® Technology. Observe real-time furnace events with our Real View® feature for deeper insights beyond thermal analysis data.

Durable, reliable, high-volume instruments for lab or production.

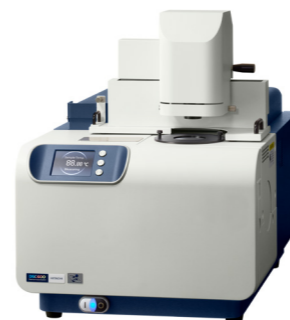
Intuitive software with guidance functions ensures ease of use for operators, regardless of experience, delivering reliable results.

Minimal liquid nitrogen use reduce operating costs

World-class baseline performance with excellent accuracy and precision, even on trace amounts.

## Visibly Better Thermal Analysis

See the full range at: [htas.net/thermalanalysis](https://htas.net/thermalanalysis)



▶ NEXTA DSC Series



▶ NEXTA STA Series



▶ TMA 7000 Series



▶ NEXTA DMA Series

## Our Services

Hitachi High-Tech's global network of service hubs offers a full range of technical support to keep you up and running.

### Repair Service

We offer a fast and efficient repair service, recertification and maintenance through our service agreements to ensure your analyzer is maintained in excellent condition and avoids any unplanned costs.

### Global Help Desks

Whenever you have a problem, we're ready to help.

### Extended Warranties

To give you extra peace of mind and avoid unplanned costs.

### Online Diagnostics

In-depth and rapid support via our website.

### Training

To help you get the most out of your analyzer and its full range of features.



# Other products.

We have been providing materials characterization instruments to a wide range of industries for over 45 years.

## Thermal Analysis

We offer a range of other thermal analysis instruments including DSC, DMA and TMA. All of these work on the NEXTA TA software platform, allowing continuity across your analysis without extra training.

## Bulk XRF

For rapid and powerful elemental analysis for a wide range of applications.

## Microspot coatings XRF

For precise analysis of the smallest samples and features.

## Hitachi High-Tech Analytical Science

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# What next?

Contact one of our experts today at:  
[contact@hitachi-hightech.com](mailto:contact@hitachi-hightech.com)

to discuss how the DMA200 analyzer could support your materials development work.

## More Information

To find out more about the DMA200 and other instruments in the Thermal Analysis range, visit [htas.net/DMA](http://htas.net/DMA)

